

IN THE CLAIMS:

Please amend Claims 1 and 12 as indicated below. Please cancel Claims 16 to 47 without prejudice or disclaimer of subject matter.

1. (Currently Amended) An optical scanning device, comprising:

light source means;

deflecting means for deflecting a light beam emitted from said light source means; and

a scanning optical system for scanning a surface to be scanned, with the light beam deflected by said deflecting means;

wherein said scanning optical system includes a scanning optical element disposed so that, with respect to a sub-scan direction, a principal ray of the deflected light beam passes a portion other than an optical axis of the scanning optical system,

wherein said scanning optical element has a sagittal aspherical amount changing surface in which an aspherical amount of a sagittal changes along a main scan direction of said scanning optical element, and

wherein, ~~throughout the whole~~ within an effective scan range upon the surface to be scanned, the position in the sub-scan direction upon which the deflected light beam impinges is made even.

2. (Original) An optical scanning device according to Claim 1, wherein said scanning optical system is arranged so that, within an effective scan range upon the

surface to be scanned, an amount of deviation of the position in the sub-scan direction upon which the deflected light beam impinges is held to be not greater than 10 μm .

3. (Original) An optical scanning device according to Claim 1, wherein the light beam emitted from said light source means is incident on a plane, perpendicular to a rotational axis of said deflecting means, with a certain angle defined thereto.

4. (Original) An optical scanning device according to Claim 1, wherein, in the sub-scan direction, the position on the surface to be scanned, upon which a principal ray of the deflected light beam impinges, is made closer to the optical axis of said scanning optical system, as compared with the position where the principal ray passes through the surface of said scanning optical element which surface has a largest power.

5. (Original) An optical scanning device according to Claim 1, wherein said scanning optical system has one or more sagittal curvature radius changing surfaces in which a sagittal curvature radius changes along the main scan direction of said scanning optical system.

6. (Original) An optical scanning device according to Claim 1, wherein said scanning optical system consists of a single scanning optical element.

7. (Original) An optical scanning device according to Claim 1, wherein said scanning optical system has a power in the sub-scan direction which is equal to or approximately equal to a power of said sagittal aspherical amount changing surface.

8. (Original) An optical scanning device according to Claim 7, wherein, where the power of said scanning optical system in the sub-scan direction is ϕ_{so} and the power of said sagittal aspherical amount changing surface in the sub-scan direction is ϕ_{si} , a relation $0.9 \times \phi_{so} \leq \phi_{si} \leq 1.1 \times \phi_{so}$ is satisfied.

9. (Original) An optical scanning device according to Claim 1, wherein said light source means emits two or more light beams, and wherein, within the sub-scan sectional plane, a principal ray of at least one light beam passes an upper side with respect to the optical axis of said scanning optical system while a principal ray of at least one different light beam passes a lower side with respect to the optical axis of said scanning optical system.

10. (Original) An optical scanning device according to Claim 1, wherein said deflecting means deflects plural light beams, wherein said scanning optical system includes a plurality of scanning optical elements for imaging the light beams deflected by said deflecting means, upon a plurality of surfaces to be scanned, which surfaces correspond to the light beams, respectively, and wherein said deflecting means is shared by plural scanning optical systems.

11. (Original) An optical scanning device according to Claim 1, wherein, where, within the main scan sectional plane, an air-converted distance from said deflecting means to a light exit surface of said scanning optical element along the optical axis is P1, a distance from the light exit surface of said scanning optical element to the surface to be scanned is P2, an air-converted distance from said deflecting means, being out of the axis, to the light exit surface of said scanning optical element is M1, and a distance from the light exit surface of said scanning optical element to the surface to be scanned is M2, the following relation is satisfied:

$$0.9 \times \frac{P2}{P1} \leq \frac{M2}{M1} \leq 1.1 \times \frac{P2}{P1}$$

12. (Currently Amended) An image forming apparatus, comprising:
an optical scanning device as recited in Claim 1;
a photosensitive member disposed at a position of the surface to be scanned as aforesaid;
a developing device for developing an electrostatic latent image formed on said photosensitive member with a light beam scanned with said optical scanning device, to produce a toner image;
a transfer device for transferring the developed toner image to a transfer material; and

a fixing device for fixing the transferred toner image on the transfer material.

13. (Original) An image forming apparatus, comprising:
an optical scanning device as recited in Claim 1; and
a printer controller for converting code data, inputted from an external equipment, into an imagewise signal and for applying the imagewise signal to said optical scanning device.

14. (Original) A color image forming apparatus, comprising:
at least one optical scanning device as recited in Claim 1; and
a plurality of image bearing members on which images of different colors are to be formed.

15. (Original) An apparatus according to Claim 14, further comprising a printer controller for converting a color signal, inputted from an external equipment, into imagewise data of different colors and for applying the imagewise data to corresponding optical scanning devices, respectively.

16. to 47. (Cancelled)

Please add Claims 48 to 63, as follows:

48. (New) An optical scanning device, comprising:

light source means;

deflecting means for deflecting said light beam emitted from said light source means; and

an imaging optical system for imaging a surface to be scanned, with the light beam deflected by said deflecting means;

wherein the light beam emitted from said light source means is incident on a plane, perpendicular to a rotational axis of said deflecting means, with a certain angle defined thereto,

wherein said imaging optical system includes an imaging optical element disposed so that, with respect to a sub-scan direction, a principal ray of the deflected light beam passes through an inside of said imaging optical element away from an optical axis,

wherein said imaging optical element has a sagittal aspherical amount changing surface in which said sagittal aspherical amount changes along a main scan direction of said imaging optical element,

wherein said sagittal aspherical amount changing surface has an absolute value of said sagittal aspherical amount which increases along the sub-scanning direction, and

wherein said sagittal aspherical amount changing surface has a sagittal curvature radius which changes along the main scan direction independently of a meridional curvature radius thereof.

49. (New) An optical scanning device according to Claim 48, wherein said scanning optical system is arranged so that, within an effective scan range upon the surface to be scanned, an amount of deviation of the position in the sub-scan direction upon which the deflected light beam impinges is held to be not greater than 10 μm .

50. (New) An optical scanning device according to Claim 48, wherein said light source means emits two or more light beams, and wherein, within the sub-scan sectional plane, a principal of at least one light beam passes an upper side with respect to the optical axis of said scanning optical system while a principal ray of at least one different light beam passes a lower side with respect to the optical axis of said scanning optical system.

51. (New) An optical scanning device according to Claim 48, wherein said deflecting means deflects plural light beams, wherein said scanning optical system includes a plurality of scanning optical elements for imaging the light beams deflected by said deflecting means upon a plurality of surfaces to be scanned, which surfaces correspond to the light beams, respectively, and wherein said deflecting means is shared by plural scanning optical systems.

52. (New) An image forming apparatus, comprising:
an optical scanning device according to Claim 48;
a photosensitive member disposed at a position of the surface to be scanned;

a developing device for developing an electrostatic latent image formed on said photosensitive member with a light beam scanned with said optical scanning device to produce a toner image;

a transfer device for transferring the developed toner image to a transfer material; and

a fixing device for fixing the transferred toner image on the transfer material.

53. (New) An image forming apparatus, comprising:

an optical scanning device according to Claim 48; and

a printer controller for converting code data, inputted from an external equipment, into an imagewise signal and for applying the imagewise signal to said optical scanning device.

54. (New) A color image forming apparatus, comprising:

at least one optical scanning device according to Claim 48; and

a plurality of image bearing members on which images of different colors are to be formed.

55. (New) An apparatus according to Claim 48, further comprising a

printer controller for converting a color signal, inputted from an external equipment, into imagewise data to corresponding optical scanning devices, respectively.

56. (New) An optical scanning device, comprising:

light source means;

deflecting means for deflecting said light beam emitted from said light source means; and

an imaging optical system for imaging a surface to be scanned, with the light beam deflected by said deflecting means;

wherein the light beam emitted from said light source means is incident on a plane, perpendicular to a rotational axis of said deflecting means, with a certain angle defined thereto,

wherein said imaging optical system includes an imaging optical element disposed so that, with respect to a sub-scan direction, a principal ray of the deflected light beam passes through a portion away from an optical axis of said imaging optical element,

wherein said imaging optical element has a sagittal aspherical amount changing surface in which said sagittal aspherical amount changes along a main scan direction of said imaging optical element, and

wherein said sagittal aspherical amount changing surface has a sagittal curvature radius which changes along the main scan direction independently of a meridional curvature radius thereof.

57. (New) An optical scanning device according to Claim 56, wherein said scanning optical system is arranged so that, within an effective scan range upon the surface

to be scanned, an amount of deviation of the position in the sub-scan direction upon which the deflected light beam impinges is held to be not greater than 10 μm .

58. (New) An optical scanning device according to Claim 56, wherein said light source means emits two or more light beams, and wherein, within the sub-scan sectional plane, a principal ray of at least one light beam passes an upper side with respect to the optical axis of said scanning optical system while a principal ray of at least one different light beam passes a lower side with respect to the optical axis of said scanning optical system.

59. (New) An optical scanning device according to Claim 56, wherein said deflecting means deflects plural light beams, wherein said scanning optical system includes a plurality of scanning optical elements for imaging the light beams deflected by said deflecting means upon a plurality of surfaces to be scanned, which surfaces correspond to the light beams, respectively, and wherein said deflecting means is shared by plural scanning optical systems.

60. (New) An image forming apparatus, comprising:
an optical scanning device according to Claim 56;
a photosensitive member disposed at a position of the surface to be scanned;

a developing device for developing an electrostatic latent image formed on said photosensitive member with a light beam scanned with said optical scanning device, to produce a toner image;

a transfer device for transferring the developed toner image to a transfer material; and

a fixing device for fixing the transferred toner image on the transfer material.

61. (New) An image forming apparatus, comprising:

an optical scanning device according to Claim 56,;

a printer controller for converting code data, inputted from an external equipment, into an imagewise signal and for applying the imagewise signal to said optical scanning device.

62. (New) A color image forming apparatus, comprising:

at least one optical scanning device according to Claim 56; and

a plurality of image bearing members on which images of different colors are to be formed.

63. (New) An apparatus according to Claim 56, further comprising a

printer controller for converting a color signal, inputted from an external equipment, into

imagewise data of different colors and for applying the imagewise data to corresponding optical scanning devices, respectively.